THE CORRELATION BETWEEN COLLEGE ENTRANCE EXAMINATION RESULTS AND SUCCESS IN THE AIR FORCE ROTC PROGRAM AT THE UNIVERSITY OF KANSAS

by

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CHAPTER I

THE PROBLEM

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THE PROBLEM

A problem confronting both civilian and military educational administrators is that of predicting the success of students enrolling in the educational institutions falling under their jurisdiction. Various reasons make a knowledge of the probable success or failure of their students imperative. In some colleges and universities the predictive value of entrance examinations is considered valid enough to either accept or refuse admission to the applicants on the basis of their test results. Others, such as the University of Kansas, use these examinations as placement tests to help guide the students into the academic channels best suited to their ability. Regardless of whether these examinations are used as standards for admittance or for guidance purposes, the fact remains that the proper use of valid entrance examinations can be a useful tool in the hands of the administrator.

The problem under consideration is one of attempting to determine to what degree, if any, a person can utilize the college entrance examinations given by the University of Kansas to predict a student's success in the Air Force ROTC program. This problem has developed because of the need for

applying a higher degree of selectivity to the students entering the Air Force ROTC program and to those students already in the AF ROTC program who are to be screened for selection into the advanced course. This need for a higher degree of selectivity has developed for various reasons. An explanation of the events that have transpired in the AF ROTC program may be helpful in giving a clearer picture of the problem and how it developed.

As a result of the National Security Act of 1947, the Air Force was separated from the Army and given equal status with the Army and the Navy. Shortly thereafter the Air Force inherited the Army Air Force ROTC program, which had established units in 78 institutions in 1946, and carried on its own ROTC program in colleges and universities throughout the United States. Because of its infancy and because of world conditions at this particular time, the AF ROTC program remained relatively small. The outbreak of the Korean conflict brought about many changes in the overall planning of the AF ROTC program. The Air Force was suddenly faced with a terrific shortage of qualified officers in all categories. New officers were needed to man the vastly expanding Air Force required to carry out the commitments brought about by the Korean action. In view of this new demand, the Air Force expanded its relatively new ROTC program and geared it to meet its new

requirements. Detachments were established in many colleges and universities not already having AF ROTC units. The number of colleges offering AF ROTC jumped from the initial 78 to 188 in 1952. Colleges and universities already having AF ROTC programs expanded their facilities, added instructors, and started a vast program for turning out Air Force officers. By 1953 the program had grown until it was offered at over 200 colleges and universities.

The need for all categories of officers was so great that an applicant was accepted into the program if he was reasonably well qualified physically and met the academic standards set by the university for entering freshmen. This was the extent of the selection process for men applying for admittance into the AF ROTC program. This program was set up as a long range program to produce officers to man a 143 wing air force and fulfill the demands of the Korean conflict. At this time the planners had no way of knowing how long the action in Korea would go on and all planning had to be made on the basis that this large number of officers would be needed four years hence. At this time it would have been suicidal to predict that the conflict in the Far East would be over in two or three years and restrict the future output of officers to a smaller number because of this prediction. For this reason and because of planning based upon a 143 wing air force,

the enrollment in the ROTC program was increased a great deal at the start of the 1951-52 school year. Nineteen hundred fifty-one found the fighting in Korea going on with increasing intensity. The first large class of freshmen AF ROTC students completed their initial year in the spring of 1952 and another large group of freshmen began their AF ROTC instruction in September of 1952. The same limited selection process was used to select these new men as was used in previous years. The last half of 1952 and the first half of 1953 found the situation in Korea almost the same except that prolonged peace talks and fighting were going on simultaneously. The first wave of the greatly enlarged 1951 class was completing their sophomore year in school and their second year in AF ROTC. Then in mid-summer of 1953 the truce talks in Korea bore fruit and the fighting stopped. Shortly after this time the Department of Defense re-assessed the requirements of the Air Force and made certain curtailments in the planned build-up of the Air Force. This brought about a re-evaluation of the personnel requirements and a subsequent change in the selection procedure to be applied to AF ROTC students. The emphasis was shifted from the production of officers of all categories to a requirement for flying officers and a very limited number of technical graduates. Whereas before the Air Force needed many officers to fill ground jobs under

the personnel requirements of the past, the "new look" called for increased numbers of flying officers and very few in other categories. Thus the students entering their senior year were advised to apply for flight training (given upon graduation from the university and completion of AF ROTC) or not expect to be commissioned at the end of their AF ROTC program. The students who started out during the first large expansion of the program were entering their junior year and their first year of advanced AF ROTC. These men were given the choice of applying for flight training after their graduation or dropping their AF ROTC course of instruction. The entering freshmen in the fall of 1953 were accepted into the program if they were thought to be in a state of health that would make them acceptable for flight training and qualified to enter the university. The selection process did not include a "flight type" physical examination, or a review of their past academic record, nor a review of their college entrance examination results. These men were advised that the majority of them would be expected to enter flight training at the time of their graduation and the completion of the AF ROTC course of instruction. This was the extent of the selection procedure utilized for the entering students in the fall of 1953. Again in the fall of 1954 this same selection process was used for entering freshmen.

The selection procedure utilized in the past for entering freshmen has not been too comprehensive since no restrictions were placed upon the number of students that could be initially enrolled in the basic course. However, one can foresee situations that may arise in the future whereby it will be imperative that a comprehensive procedure be adopted and utilized in the selection of applicants. One would not go too far "out on the limb" in predicting a time when the Air Force will have to limit the number of students it is able to accept into the ROTC program. If this comes about, as it has already in the Navy ROTC program, the Air Force will be faced with a large number of applicants at each university and only a limited number of enrollment vacancies. It would be advisable for each detachment to establish selection machinery which could be used to select the men most likely to succeed in the program. The need for fewer and fewer graduates, the shortage of funds, etc.--any one of a number of reasons could make it absolutely necessary that utmost care go into the initial selection of students. This writer, visualizing such a condition developing within the near future, is directing this study toward an analysis of one possible selection tool in hopes that the results will prove beneficial in developing a comprehensive selection procedure geared for a highly competitive selection process.

Already the amount of money allocated to the Air Force has been curtailed. Every effort is being directed towards utilizing Air Force funds in such a way that the greatest return is derived from each dollar spent. One way of seeing that this is done, as far as the money allocated for training and educational purposes is concerned, is to insure, as nearly as possible, that the men accepted for training can reasonably be expected to successfully complete their program of instruction and fill the position for which they were trained. One way to accomplish this end is to develop a comprehensive screening process with which applicants can be sifted and those filtered out who, according to our predictions, can not be expected to successfully complete the course of instruction. After the selection is completed, time can be devoted and resources applied toward educating the men who hold the best possible chance for success. This is diametrically opposed to the generally accepted philosophy on general education, but this problem is of a different nature. The selection of students should be based upon the results obtained from the devices or tools decided upon as best adapted for the particular problem. The success in the selection of students will be only as good as the tools used in the process. The problem presented by this study is one of determining if the college entrance examinations can be used as a valid tool in this

selection process. If it is found that these entrance examinations have high predictive capacity regarding the degree of success or failure in the Air Force ROTC program, then another tool is available for use in the selection process.

There are several proven tools that can be utilized in the selection of students. One, if the need is for flight personnel, is the "flight type" physical examination. Men who could not pass this type physical examination would be disqualified for entrance into the program. The validity of this tool is proven. If the tool under study in this problem could be shown to hold the degree of validity of the medical examination, then it could undoubtedly be accepted as a valid instrument. Another tool at our disposal is the Air Force Officer Qualification Test Battery. This battery is made up of nine individual tests. These tests cover the following areas: pilot aptitude, observer technical aptitude, officer aptitude, quantitative aptitude, flying interest, technical interest, administrative interest, and quantitative interest. The reliability and validity of this battery of tests has been proven by past experience. It was found during World War II that the predictive value of these tests or very similar tests was excellent. In fact, portions of this battery were relied upon as one of the major devices for determining the men who were accepted

for flight training. As a result of thousands of men taking these examinations and the subsequent verification of their validity, this test was proven to be a valuable tool in the selection of commissioned flying personnel. It has proven so successful that it has been adopted as a selection device for men applying for entrance into the AF ROTC advanced course. The Air Force Officer Qualification Tests and the medical examinations give us two excellent selection devices.

If the need for a more thorough and comprehensive method of selection arises, there are other devices that could possibly be used. Among these are the results of the entrance examinations given by most colleges, high school grades, general intelligence tests, personal interviews, and others. Enough research has been done with these devices to show their usefulness in predicting success in other curricula, but to the knowledge of the writer, they have not been proven in the case of the Air Force ROTC curriculum. This study will attempt to determine whether or not the entrance examinations at the University of Kansas can be used as selection tools. If they can, then they could be used in conjunction with the Air Force Officer Qualification Tests and the "flight type" physical examination. At some later time it might be advisable to do further research on other possible selection devices such as selection based on high school grades and other

devices of a similar nature to see if they could be used as predictors of success in the Air Force course of study. This study, however, will be limited to research on the University of Kansas entrance examination battery as related to its predictive value in the Air Force ROTC program.

The University of Kansas gives the entrance examinations to every new undergraduate student and the Guidance Bureau has made these results available to the Air Science Department upon request. It is the objective of this study to analyze a group of students who have taken the entrance examinations and who have been enrolled in the Air Force ROTC course to determine the degree of correlation between the results of the entrance examinations and their success in the Air Force ROTC program.

CHAPTER II

REVIEW OF RELATED RESEARCH

As far as can be determined there are no published research studies dealing with exactly the same problem outlined in Chapter I. However, there are numerous published studies dealing with problems of a similar nature. In view of the lack of previous research dealing with the problem under consideration, a review will be made of the literature dealing with closely related problems.

The research dealing with the forecasting or predicting of academic achievement or success in college is very comparable to the problem under consideration. In Ruth T. Lehman's study[1] she reported the results of a research made on a class of 110 students entering Ohio State University as freshmen. The problem was to determine if a prediction index derived from various rating devices could be used to predict the success or failure of the group of students under surveillance. The evaluation instruments used in deriving a prediction index were as follows: The Ohio State Psychological Examination, the four Robinson-

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1 Ruth T. Lehman. "Forecasting the Academic Achievement of College Freshmen." Educational Research Bulletin, Vol. XXXIII, No. 5, May 12, 1954, pp. 113-121.

Hall Reading Tests, the Reavis-Breslich Diagnostic Tests in the Fundamental Operations of Arithmetic and in Problem Solving, and the Mooney Problem Check List.

From the results obtained from these instruments, it was predicted that thirty-five members of the group would receive very low marks at the end of their first quarter and that twenty-eight of the group would receive high marks. On the whole, both groups lived up to the predictions. On a grade scale using "A" as equal to four points per hour of credit, "B" three points, etc., these were the results: Less than fifteen per cent of those for whom low marks had been predicted had a point-hour ratio as high as 2.50. Forty per cent were below the dismissal level of 1.50 or had withdrawn or been marked "incomplete." Of those who had been predicted to make high marks, about two-thirds had a point-hour average of at least 2.50 and half of these a "B" average or higher. None of this group received averages which were at the dismissal level and less than fifteen per cent were below 2.00. The mean point-hour ratio of the low prediction group was 1.68 and the high group had 2.68.

The predicted high group was definitely superior in speed and comprehension in the reading examinations. Also in the arithmetic test the high and low groups were sharply differentiated. In marking the Student Problem

Check List, the predicted low group had indicated more than twice the number of problems shown by the predicted high group. In addition, there was a marked difference in their ability to do college work as judged by the results of their psychological test scores.

Absolute and final conclusions cannot be drawn from this study because of its limited nature; however, it does indicate that further study along this line may produce added verification of the conclusions brought out here. It does indicate that it is very probable that instruments like the ones used in this study could be utilized as a tool for predicting success in various fields of academic endeavor.

A study by Warren R. Graham[1] attacked the problem of identifying and predicting the variables which are involved in the successful completion of the Naval Pre-Flight training program. A battery of standard tests was administered to entering students and scores from these predicators were correlated with subsequent classroom and final examination grades. The following tests were administered: Language Skills Test, G.E.D. College level, Minnesota Clerical-Name Checking, Mathematics-Diagnostic, Mathematics-Reasoning, Mathematics-Total (combined scores

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1 Warren R. Graham. "Identification and Prediction of Two Training Criterion Factors." Journal of Applied Psychology Vol. 38, No. 2, April, 1954, pp. 96-99.

of two mathematics tests), American Council on Education Psychological Examination Q Score, ACE Psychological Examination L Score, ACE Psychological Examination-Total, Aviation Classification Tests, and the Mechanical Classification Test.

This study used a sampling of 399 students enrolled in Naval Pre-Flight training at the Pensacola Naval Air Station. The results of the battery of examinations outlined above were correlated with the grades the students received in various courses included in their academic training such as Aerology, Engines, Principles of Flight, Direct Reckoning Navigation, and Celestial Navigation. It was found that these tests have varying degrees of predictive capacity depending upon the course of instruction under consideration. For example, success in Navigation is best predicted by the tests of arithmetic and clerical (name checking) abilities and negatively predicted by the tests of linguistic abilities (the ACE Test-L Score in this case). This same correlation was done for other phases of the training program.

If this study is truly representative, one would draw the conclusion that tests such as these administered to this group of men can be used as predicators of success in the various subject matter fields considered in this study.

Still another study by Joics B. Stone[1] deals with a research on prognosis of college academic success. This study evaluates the predictive capacity of three tools: the total high school grade point average--HSGPA, the 1949 editions of the American Council on Education Psychological Examination--A.C.E., and the Cooperative General Culture Test--CGCT. This study uses these standards for predicting the degree of success a student could expect if enrolled in any of the following departments at Brigham Young University: Commerce, Elementary Education, Physical Sciences, and Social Sciences. A research was conducted to find out the degree of correlation between the alleged predictors and the student's academic success as indicated by his cumulative grade point average.

The following are the conclusions of the author which are of interest to the present study:

1. The utilization of entrance test data and high school grade-point average provides the counselor at Brigham Young University with the basis for making differential predictions of academic success in four curricula.

2. For Commerce and Elementary Education, the most efficient battery included the HSGPA and A.C.E. Total scores. The R's were .633 and .731.

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1 Joics B. Stone. "Differential Prediction of Academic Success at Brigham Young University." Journal of Applied Psychology, Vol. 38, No. 2, April, 1954, pp. 109-110.

3. The Physical Sciences criterion was best predicted by a battery including the HSGPA, A.C.E. Total, and CGCT Literature and General Science. R for this battery was .733.

4. The Social Science predictor battery included the HSGPA, A.C.E. Total and CGCT General Science. R was .507.

5. The best single predictor was the HSGPA.

This study is similar in many ways to the study which will be attempted in this thesis. The A.C.E. and other predictors will be tested to see if they can forecast the academic success of students enrolled in the Air Force ROTC curriculum.

A study by E. B. Bolton[1] attempted to compare the predictive value for academic achievement in a general education program of two standard tests of vocabulary with that of the A.C.E. English Examination for College Students. The conclusions pertinent to the study at hand are expressed by the author as follows:

> The total scores made on the A.C.E. Cooperative English Test predicted the academic achievement of this group of students during their first year in college better than any of the other test scores used in this analysis. The L-scores of the Psychological Examination, the Columbia vocabulary scores and the English

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1 E. B. Bolton. "The Predictive Value of the Columbia and the Michigan Vocabulary Tests for Academic Achievement." Peabody Journal of Education, Vol. 32, No. 1, July, 1954, pp. 9-21.

> vocabulary scores predicted academic success almost as well as the total English scores. The verbal abilities and general concepts measured by these tests had better predictive value for successful mastery of the general education courses which these students were required to take during their first year in college than the knowledge of concepts in special subject matter fields measured by the Michigan vocabulary scores.

This study is significant in that some of the same predictors tested by Bolton will be among the ones which will be analyzed in the following chapter. The procedures will be different but the goal of finding the best predictors of academic achievement will be the same. However, in this study an attempt will be made to find out if the alleged predictors available to us are valid enough to be used for our particular purpose.

A study dealing with the predictive value of the American Council on Education Psychological Examination[1] tried to determine the relative validity of the quantitative, linguistic, and total A.C.E. scores in the prediction of final marks earned in specific courses at the University of Wisconsin, Milwaukee Extension Division. A group of college freshmen was used in the study. Previous unpublished research had indicated the mean A.C.E. scores for Milwaukee Extension students were consistently from 8 to 10 centiles

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1 Mary A. Hoerres and J. David O'Dea. "Predictive Value of the A.C.E." The Journal of Higher Education, Vol. 25, February, 1954, p. 97.

higher than the national norms. The 1947 edition of the A.C.E. was administered to 350 freshmen students. The test results were correlated with first and second semester grade-point averages in eight fields. The following were the fields used: English, Mathematics, Physics, Chemistry, Biological Science, Social Science, Foreign Language, and Art. Correlations were obtained by use of the Pearson Product-Moment Method.

Correlations significant at the 1 per cent level were reported in six of the eight academic fields between the linguistic (L) score and the first-year grade-point average. The quantitative (Q) score and first-year grade-point averages were significant at the 1 per cent level in four academic fields. The ranking of correlations with total grade-point averages according to magnitude for subject fields was as follows:

Q Correlations

Physics	.37
Chemistry*	.37
Biology*	.36
Mathematics*	.29
English*	.22
Foreign language	.11
Social Science	.11
Art	.13

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* Significant at the 1 per cent level.

L Correlations

English*	.45
Biology*	.43
Physics**	.42
Social Science	.41
Chemistry*	.32
Foreign language*	.23
Mathematics	.19
Art	.16

Total Score Correlation

Physics*	.54
Biology*	.49
English*	.42
Social Science	.38
Chemistry*	.37
Mathematics	.25
Foreign language	.22
Art	.06

The writers of this study reported general information concerning the research and because of this factor they suggest that detailed findings indicate that the A.C.E. was significant only in terms of general group predictiveness and therefore it would appear advisable not to use the A.C.E. in isolation as a predictive device in individual counseling. In addition, this was said:

> Unless the relationships of the American Council on Education Psychological Examination scores with specific course marks in any given institution using the instrument are known, it is not possible to predict the outcomes of courses with any degree of accuracy.

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* Significant at the 1 per cent level.

** Significant at the 5 per cent level.

This last statement indicates that it would be a fallacy to assume that the validity of the A.C.E. as a predictive instrument at the University of Wisconsin was concrete evidence that the same degree of validity could be expected at another institution in a given subject matter field. The subject matter field under consideration in this study is not one of those included in the Wisconsin study, but even if it were, it would behoove the author to make an independent research at his own institution to see if the same assumption could be made as was presented in the study just reviewed. The field of study being analyzed in this research (Air Science) combines many of the aspects of the various subject matter fields covered in the Wisconsin study, so it will be interesting to see to what extent the present study agrees with the study of Hoerres and O'Dea.

Another rather interesting study deals with the prognosis of success of college freshmen by various methods.[1] This research is concerned mainly with an evaluation of self-predictions by the students as compared with forecasts made by other methods such as counselor's predictions, high school rank, A.C.E. Psychological Examination, etc.. The most significant aspect of this study is the

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1 F. Chandler Young. "College Freshmen Judge Their Own Scholastic Promise." The Personnel and Guidance Journal, Vol. XXXII, No. 7, March, 1954, pp. 399-403.

correlation found between the predictive instruments and the actual academic achievement of the students. However, it is interesting to note that self-predictions positively correlated to an appreciable degree with actual achievement and that they correlate with actual achievement to a positive extent equal to or higher than predictions made from such other sources as a counselor's predictions, a student's high school rank, A.C.E. Psychology Examinations, and other predictors. This is shown by the following chart:

Coefficients of Correlation between Various Predictors and the Actual Scholastic Achievement of First Semester College Freshmen, University of Wisconsin. N is equal to 91.

Predictive Measures	Coefficients of Correlation with Actual Achievement
Self-predictions	0.61 to 0.71
Counselor's predictions	0.68
High School rank	0.61
Ability test*	0.50
Mathematics Achievement Test**	0.53
Science Achievement Test***	0.53
Literature Achievement Test***	0.30
Art Achievement Test***	0.28
Social Studies Achievement Test***	0.25

* American Council Psychological Examination for College Freshmen, 1948 edition, total raw score.

** American Council Cooperative Mathematics Pre-Test for College Students, Form Y (raw scores)

*** American Council Cooperative General Culture Test, revised series, Form X (raw scores)

Because of the limited number of samples used in this study, it is not possible to consider the results

conclusive, but they do compare favorably with outcomes of other investigations.

Another interesting report is one which was developed as part of a research program dealing with the superior student in the College of Education at Ohio State University.[1] This study represented an attempt to select a group of potentially superior students on the basis of four criteria and to predict for them ultimate success in college. A total of 170 students was selected and placed into four groups; two potentially superior and two non-potentially superior groups. The two non-potentially superior groups were included in order to determine any differentiation between the groups and in this way a test could be made of the validity of the selection criteria. The criteria for selection by groups were as follows: First, the potentially superior group had to be in the upper third of their high school graduating class. Second, they had to have a score on the Ohio State Psychological Examination that fell within the 80th to 100th percentiles. Third, they had to have a record of participation in several high school extra-curricular activities. Fourth, they had to receive an outstanding recommendation from their high school teachers or

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1 Patricia S. Maclachlan and Collins W. Burnett. "Who Are the Superior Freshmen In College." Personnel and Guidance Journal, Vol. XXXII, February, 1954, No. 6, pp. 345-349.

principal. The students fulfilling these criteria were placed in the potentially superior group (Group I). Another group was established which also was considered as a potentially superior group. The students in this group had to satisfy any three of the criteria outlined for the students in Group I. This second group was known as Group II. A third group was established and these students had to fulfill any three of the criteria outlined below for the fourth group. Group III were students predicted to be potentially non-superior as was the case for Group IV. The requirements of Group IV were as follows: First, they had to be in the lower third of their high school graduating class. Second, their score on the Ohio State Psychological Examination had to fall within the 1st to 20th percentiles. Third, their records had to show very little or no participation in high school extra curricular activities. Fourth, predictions of their high school principal had to indicate that their chance for academic success in college was poor.

One of the major purposes of this study was to test the validity of the selective criteria and to evaluate their worth as predictors of the potentially successful and superior college student. The criterion of greatest interest to this research is the Ohio State Psychological Examination. An attempt was made at proving the validity of this criterion by comparing the grade-point averages of

the four groups as shown in the chart below.

Distribution of Point-Hour Ratios for the First Quarter in College (N equal to 164)

Point-Hour Ratios*	Number of Students Group I	II	III	IV
3.50-4.00	14	7		
3.00-3.49	13	20		
2.50-2.99	8	28	2	1
2.00-2.49	3	19	8	4
1.50-1.99		4	10	2
1.00-1.49		3	4	4
Below1.00			6	3
Mean point-hour ratio	3.26	2.69	1.64	1.64

* "A" is equal to 4.0
"B" is equal to 3.0
"F" is equal to 0.0, etc.

This seems to indicate the value of the Ohio State Psychological Examination as a predictor in this situation. However, it only proves the validity insofar as Group I and Group IV are concerned in that Group II and Group III would not necessarily have to fulfill the second criterion (Ohio State Psychological Examination score falling within the 1st and 20th percentiles for Group III and falling within the 80th and 100th percentiles for Group II) since the students in these groups only had to qualify on three of the

four criteria. Another limitation of this study is that it only covers the students' first quarter grades. It would be more conclusive if grades could have been used covering at least a year's work.

The authors summarize their research with the following conclusion: "...it can be inferred that the Ohio State Psychological Examination seems to be a fairly valid and useful selection measure."

Yarrow[1] obtained the following coefficients of correlation between the Iowa Qualifying Test Battery and general grade point average earned by a group of university freshmen:

Test	r
Iowa Qualifying, Composite	.55
Foreign Language Aptitude	.52
High School Content, Composite	.46
Mathematics Aptitude	.44
English Training	.44
Reading Comprehension (Cooperative)	.38

1 L. J. Yarrow. "Measurement and Prediction of the Differential Achievement of College Freshmen." Master's Thesis, State University of Iowa, 1942.

CHAPTER III

SOURCES OF DATA AND PROCEDURES

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SOURCES OF DATA AND PROCEDURES

This study endeavors to determine the correlations existing between parts of the University of Kansas entrance examination battery and student academic achievement in the Air Force ROTC curriculum. Basically, it is a problem of sampling an adequate number of Air Force ROTC students and determining the relationship that exists between the grades received in the AF ROTC curriculum and the scores made on the entrance examination battery. Before describing the procedures that will be used, an analysis will be made of the student under study and his Air Force ROTC curriculum.

Description of the Students under Study

First, it was decided that in order to give the results of this study as much reliability as possible, a comparatively large number of students should be used in the sample group. After considering all factors involved, it was decided to select at random 500 AF ROTC students falling in various categories. It was felt that this number should be sufficiently representative of the entire group of students. The group was classified into the following categories: (a) graduates of the AF ROTC curriculum, (b) seniors in their last year of the program,

(c) juniors now enrolled in their next to last year, (d) students who have withdrawn from the course for various reasons, (e) students who have failed the course. The breakdown of these categories is as follows:

1954 graduates	120
Present seniors	120
Present juniors	120
Failures in course	80
Withdrawals	60
	500

Grades were obtained by searching the individual student records at the Air Force ROTC office and compiling the grades for each semester of attendance. The 1954 graduates have had a total of eight semesters of work as indicated by eight letter grades. The present seniors have a total of six semester grades and the juniors have four. The group of failures have a record of from one to six semesters. It would be well to describe the procedure used with the students who record a failure for any semester. Once a student makes a failing semester grade, he is automatically eliminated from the Air Force ROTC program and can no longer enroll. This is one reason why the students in the failing group vary from one to six semesters in the grades tabulated. In most cases the last grade recorded is the "F" that eliminated the student from the program. There is only one exception and this is the case where a

student has been eliminated from the program because his cumulative grades were so low that continuance in the program was not advisable. There are several students appearing in this group for this reason. The last group tabulated is the group of students withdrawing from the program for various reasons. This group has from two to six semester grades recorded for them. A few words of explanation would be appropriate at this time regarding the students falling in this group.

The students in the "withdrawals from program" group have become withdrawals for various reasons. As in any department in a university, withdrawals occur for various reasons. Without having concrete evidence to prove the point, one could venture the guess that the most prevelent reason for withdrawals from any department would be because the student failed to achieve academic success in this particular department. Of course, there are obviously many other reasons for the withdrawal of students, but it is probable that this one reason constitutes, more than any other, the biggest cause for student withdrawal. At first it seemed this might have been the reason most of the Air Force ROTC students fell in this category. With this in mind, these students were selected since it was thought they might represent another distinctly separate segment of the student body. However, upon further

investigation it was found that unsuccessful academic achievement was not necessarily the primary reason for the students being listed as withdrawals. The Air Force ROTC course is unique in that many other factors enter into the student's continuance or non-continuance in the program. Probably one of the biggest single factors influencing the students is the change in Air Force policy toward the type of graduate expected from the Air Force ROTC program. In other words, the emphasis is placed on graduates desiring flight training rather than producing officers in all categories. As mentioned in Chapter I, when this policy changed in 1953 the students were given the opportunity to commit themselves for flight training after graduation or giving up the Air Force ROTC course of study. This was responsible for many of the withdrawals recorded in the last group described in this study. In addition, there are other students in this group that would have liked to fly, but could not pass the "flight type" physical examination. Then there are the students in the "withdrawal group" who experienced very little success in the course and withdrew for this reason. In addition, we have several students who withdrew to attend other universities and others who just did not care for the course. All in all, this group is made up of students who have withdrawn for any one of a number of reasons. It is difficult to determine from the records the reason for withdrawal

in many cases. It is felt, however, that this group should be included to complete a truly representative sampling.

To provide a better understanding of the method by which grades are determined and the type of curriculum upon which these grades are based, it would be well to describe the curriculum and show how the grades are derived.

Analysis of the Curriculum

First, a look at the curriculum. Although it is not necessary to go into detail regarding the curriculum, it would be helpful to present at least its basic structure. An understanding will be helpful in showing the relationship that exists between the Air Force ROTC curriculum and the other curricula offered by the university. Since many of the studies reviewed in Chapter II reported the findings of studies dealing with the prediction of academic success in other university courses and departments, a comparison between the Air Science curriculum and the courses offered by the other departments should be helpful. The Air Force ROTC curriculum is shown in Tables 1 through 4. A look at the course of study shows that the Air Force ROTC curriculum is a far cry from the old ROTC course of a few years ago when the course included such subjects as first aid, map reading, etc..

TABLE 1

AIR FORCE ROTC GENERALIZED COURSE OF STUDY

AIR SCIENCE I. THE AIRPLANE AND THE AIR AGE

Freshman Year

First Semester*

	Class Hours
Introduction to AF ROTC	4
Introduction to Aviation	16
Fundamentals of Global Geography	10
Leadership Training--Laboratory	15
	45

Second Semester*

	Class Hours
International Tensions and Security Structures	15
Instruments of National Military Security	15
Leadership Training--Laboratory	15
	45

* Basic Course: Two hours of academic subject matter plus one hour of laboratory per week.

TABLE 2

AIR FORCE ROTC GENERALIZED COURSE OF STUDY

AIR SCIENCE II. ELEMENTS AND POTENTIALS OF AIR POWER

Sophomore Year

First Semester*

	Class Hours
Careers in the United States Air Force	6
Moral Responsibility of Air Force Leaders	1
Introduction to Aerial Warfare	3
Targets	6
Weapons	14
Leadership Training--Laboratory	15
	45

Second Semester*

	Class Hours
Aircraft	10
Bases	6
Operations	14
Leadership	15
	45

* Basic Course: Two hours of academic subject matter plus one hour of laboratory per week.

TABLE 3

AIR FORCE ROTC GENERALIZED COURSE OF STUDY

AIR SCIENCE III. THE AIR FORCE OFFICER IN THE AIR AGE

Junior Year

First Semester*

	Class Hours
Introduction to Advanced Air Force ROTC	2
The Air Force Commander and His Staff	8
Creative Problem Solving	20
Communicating in the Air Force	25
Instructing in the Air Force	5
Leadership Training--Laboratory	15
	75

Second Semester*

	Class Hours
Instructing in the Air Force (continued)	5
The Military Justice System	15
Air Navigation	15
Weather	15
Air Force Base Functions	10
Leadership Training	15
	75

* Advanced Course: Four hours of academic subject matter plus one hour of laboratory per week.

TABLE 4

AIR FORCE ROTC GENERALIZED COURSE OF STUDY

AIR SCIENCE IV. LEADERSHIP AND AIR POWER CONCEPTS

Summer Camp

	Class Hours
Reception and In-Processing	8
Chaplain's Indoctrination	2
Weapons and Marksmanship	7
Physical Training	15
Leadership Drill and Exercise of Command	41
Officer Orientation	4
Organization of an Air Force Base	23
Air Crew and Aircraft Indoctrination Training	49
Camp Commander's Time	12
Student Free Time	8
Out-Processing	5
	174

Senior Year

First Semester*

	Class Hours
Career Guidance	4
Moral Responsibility of Air Force Leaders	1
Leadership and Management Seminar	40
Military Aviation and Evolution of Warfare	15
Leadership Training--Laboratory	15
	75

Second Semester*

	Class Hours
Military Aviation and Evolution of Warfare (contd.)	5
Military Aspects of World Political Geography	45
Briefing for Commissioned Service	10
Leadership Training--Laboratory	15
	75

* Advanced Course: Four hours of academic subject matter plus one hour of laboratory per week.

The curriculum is designed to provide a course of study pointed toward a general military education. The course of study incorporates many of the aspects of the liberal arts tradition which even our most technical schools today recognize and subscribe to in varying degrees. In view of this changed philosophy, Air Science is not a pure science in the true sense of the word but holds social and cultural meaning as well. Many of the subject matter areas approach phases of the traditional curriculum. You will note this to be the case in the blocks of instruction in geography, communication, problem solving, management, political geography and others. The Air Force feels that the close relationship that exists between the ROTC course of study and the rest of the college curriculum is very desirable. In having this relationship, it provides points of contact for the articulation required to make the Air Force ROTC curriculum a living member of the group of studies pursued by the students enrolled in the various departments of the university. The attempt is being made to make Air Science a vital and worthwhile phase of general education and not an appendage of the college curriculum.

As one will note after studying Tables 1 through 4, military subjects are not neglected but rather they are integrated with the subjects of a more general nature. Leadership training is stressed throughout the entire course.

The curriculum is divided into the basic course, covering the first two years, and the advanced course covering the junior and senior years. In addition, it is noted that the student receives actual experience for thirty days on an Air Force Base during Summer Camp which comes between his junior and senior years. The curriculum is divided into blocks of instruction totaling 480 hours and allocated on the following basis: freshman and sophomore years, 90 hours each, and junior and senior years, 150 hours each. In addition the students receive 174 hours more at Summer Camp.

An examination of the curriculum will indicate the generalized nature of the program--the emphasis being on producing well-rounded junior grade officers with high growth potential.

Student Evaluation

The method of evaluation of the Air Force ROTC student is somewhat different from the evaluation procedures used in other departments. Basically, the evaluation is the same; however, because of the necessity for evaluating the leadership potential of the individual students, it is different in several respects. The end product is the same--that is, the traditional "A", "B", "C", "D", or "F" letter grade, but the method of arriving at these grades should be explained.

The purely academic work of the student in the classroom is evaluated just as most of the other academic subjects taught on the campus are evaluated. Each instructor, of course, has the option of grading the way he feels best, but usually his grading will be very similar to the usual pattern found in most universities and colleges. The evaluation usually consists of from one to five examinations during the semester plus the final examination of the semester. In addition, there may be short 10 minute examinations and possibly a grade entered for class participation or outside projects. The composite of these evaluative methods is used to make up the final classroom grade. However, this classroom grade does not represent the final grade the student receives for his semester's work. In addition, there are two other factors that enter into the final grade that is awarded for the semester.

The leadership training received by the student is felt to be a very important part of his training and as such should be evaluated and the results made a part of the student's final grade. A large portion of this training is accomplished on the drill field during the one hour each week assigned for this purpose. Other aspects of his leadership training include his participation in cadet staff work, planning and directing cadet activities, and other work that furthers the development of leadership ability.

It should be pointed out here that all students have the opportunity to practice and develop their leadership abilities through the cadet organizational plan of operation. Under this plan the entire cadet corps is set up and organized in the same manner as an Air Force organization. In other words, the students have their own Wing Commander, Group Commanding Officers, Squadron Commanding Officers, Flight Leaders, etc.. All of the students in these positions have their respective staffs and function just as an active Air Force organization. The students are responsible for the planning and execution of all cadet corps functions including the training program on the drill field, staff meetings, disciplinary measures under their jurisdiction, the flying orientation program, the cadet drill team, the cadet band, social functions, the publication of a cadet newspaper, etc.. Staff members advise and give assistance, but the actual functioning of the cadet corps is carried out by students themselves. By observing the students in their individual positions of responsibility, the staff member has an excellent method of evaluating the student's training. In addition, the students are given the opportunity to evaluate other students falling under their jurisdiction. All in all, this method of providing leadership training has proven to be very successful. Students have an opportunity to put into actual practice the theories of leadership learned in the classroom. In

addition, this method gives the staff member a valuable tool that can be utilized as a basis for awarding another portion of the student's final semester grade. The evaluation is accomplished on a form called The Cadet Military Effectiveness Rating. A copy of this form is found in Appendix A. The numerical value taken from this instrument is given a certain weight and applied to the classroom grade in making up the final composite grade. The weight given this part of the student's training will be explained later.

Still another facet of the student's final grade is derived from another source. A system of merits and demerits has been established. The student is awarded merits for such things as outstanding performance, participation in extra-curricular activities such as the drill team, cadet band, rifle team, and other acts deemed meritorious. By the same token, demerits are awarded for such misdemeanors as an untidy appearance on the drill field, absence from a scheduled formation, being tardy, etc.. Merits and demerits are awarded by an established standard. The final merit-demerit score is a numerical value that is used as a portion of the student's final semester grade.

The three factors outlined above--the classroom grade, the leadership grade (Cadet Military Effectiveness

Rating), and the merit-demerit score--all go into making up the final semester grade. The classroom grade counts 70% of the final grade, the Cadet Military Effectiveness Rating counts 10%, and the merit-demerit score counts 20%. By using this method an attempt has been made to evaluate the student, not only through his performance in the classroom but also on other factors considered important in the successful completion of his course of study. The method by which these grades were determined should be kept in mind when reviewing the grades tabulated for each of the 500 students.

The Entrance Examination Battery

The battery of examinations given entering freshmen at the University of Kansas consists of the following:

1. The American Council on Education Psychological Examination for College Freshmen. 1948 Edition
2. Reading Comprehension, Test C2, Form Y. This is one of three tests of the Cooperative English Test, Single Booklet Edition (Lower and Higher Levels)
3. Cooperative English Test (Usage, Spelling, Vocabulary) Form OM
4. Mathematics Test For Entering Students, University of Kansas, Form D-47.

The American Council on Education Psychological Examination for College Freshmen is an examination that is especially designed for the appraisal of scholastic aptitude, or general intelligence, with reference to the requirements

of most college curricula. The test is divided into two parts: the linguistic section which yields the L-score and the quantitative which yields the Q-score. The L-score is indicative of ability to succeed in those fields which require proficiency with language and facility of expression. The Q-score measures ability to deal with the type of material covered in technical curricula. Separate scores for the Linguistic and Quantitative as well as a Total score are obtained. The working time on this examination is sixty minutes.

The Reading Comprehension Examination consists of two parts. The first part is made up of sixty synonyms, which test vocabulary knowledge. The second part contains reading paragraphs covering a varied assortment of subjects. The 90 reading items are grouped in three repeating scales of equivalent difficulty and are arranged in such a way that separate scores are obtainable for speed of comprehension and for level of comprehension. Test C2 is recommended for superior 11th and 12th grade and college students. The measures covered are vocabulary and speed of comprehension. The time allocated to this examination is forty minutes.

The Cooperative English Test evaluates several important English skills. Those covered are: Usage, Spelling, and Vocabulary. The first part requires the student to select from several choices the correct grammatical construction, to punctuate, to capitalize, and to choose

from groups of four similar sentences the one which is best in structure. The second part contains 45 spelling questions and the third tests word knowledge, presenting to the student 100 vocabulary questions representing a wide range of difficulty. This test measures growth in basic competencies and should be a fairly good predictor of success in certain fields. The time allocated for this examination is seventy minutes.

The last test in the battery is the Mathematics Test For Entering Students, University of Kansas, Form D-47. This test has been included in the entrance examination battery at the University of Kansas for several years and has been put to various uses. The Mathematics Department uses the results to place students in the proper level mathematics courses. The Guidance Bureau, of course, uses the results in its student counseling. This examination consists of three parts: Part One is the basic arithmetic section. It contains 25 problems dealing with integers, common fractions, decimals, and simple applications of percentage. Part Two of the test deals with Geometry. There are 25 questions dealing with basic geometry problems which test the student's knowledge of plane geometry. The third section includes 25 problems covering algebra.

Procedures

The first step was to select a group of students who would be truly representative of the entire Air Force

ROTC body. At first it was decided to start with the 1953 graduates, take a sampling of them, and then progressively take samplings through the 1954 graduates and other representative groups of students. It was found, however, that the majority of the 1953 graduates enrolled at the University of Kansas in 1949 or earlier. There was nothing wrong with this except for the fact that in 1950 the entrance examination test battery was changed and the scores obtained prior to that time could not be used on a comparable basis with the test results after 1949. In view of this, it was decided that only students entering the University of Kansas during the fall of 1950 and later could be used in this study. As a result the graduating class of 1953 was not used. The first group selected was a group of 1954 graduates (120). The next group selected was a group of men (120) who are now seniors in the Air Force ROTC program. Another group (120) was selected from the men who are juniors now. Still another group of men (80) was selected, and these men were chosen because they had failed the course and were no longer enrolled. The last group of men (60) was chosen because it sampled another segment of the student body. These men were the ones who had withdrawn from the Air Force ROTC program for various reasons. There is no need to further elaborate on these groups since they were adequately described earlier in this chapter under the Description of the Students Under Study.

After these groups were selected, the grades of these students were located and tabulated. The Air Force ROTC office maintains a folder for each student which contains all of the pertinent records and papers accumulated by the student throughout his entire enrollment in the program. Included among these records is a form on which all grades are located. The grades for each of the 500 students were obtained by copying each semester's grades directly from this form.

After all grades were tabulated, a search was made through the K.U. entrance examination results and these were tabulated for all students in the various groups.

This completed the first phase of the study. The tedious work of collecting and assembling the raw data was completed and the next step was to formulate a plan of attack which could be used to transform the mass of raw data into meaningful information. The following plan of attack was adopted:

1. Take the letter grades for each group and consolidate them into grade-point averages, using a convenient numerical scale.

2. Figure grade-point averages for both the basic course and the advanced course for the 1954 graduate group and the senior group. For the 1954 graduate group also figure a total grade-point average for the entire eight semesters. In the case of the junior group, the withdrawal group and the failure group, figure only basic course grade-point averages.

3. Take the basic course grade-point averages for each group and set them up into frequency distributions.

4. Calculate mean grade-point averages for each frequency distribution.

5. Make graphs and tables to portray the results of the first four steps.

6. Write an analysis of the results obtained in steps one through four.

7. Using the basic grade-point averages for all groups, figure the mean grade-point average of each group and set up a graph to portray the results.

8. Write an analysis of the results obtained in step 7.

9. For the 1954 graduate group, set their advanced course and entire course grade-point averages up into frequency distributions. Portray these with necessary graph and tables.

10. Use the basic course mean grade-point average calculated in step 3 along with the advanced course and entire course mean grade-point averages to show a comparison between the grades received the first two years and those received the last two years. Also compare these with the mean grade-point average for the entire course.

11. Set up the information accumulated in step 10 in graphic form.

12. Use the same procedure with the senior group and compare these results with the results obtained in the analysis of the 1954 graduate group. See how closely the advanced course grades are related to basic course grades.

13. Write an analysis of the results obtained in steps 10 and 12.

14. Set up data and figure the coefficient of correlation between basic grade-point averages and advanced course grade-point averages.

15. Using basic grade-point averages, divide each group (all except the failure group) into the top 25% and the lower 25%.

16. Figure the mean raw score made on each test of the entrance examination battery for the top 25% and the lower 25% of each group. Portray the results in table form.

17. Figure the mean raw score made on each test of the entrance examination battery for each group and compare the groups with each other in relation to the averages made on each test. Set this up in table form.

18. Find the coefficient of correlation existing between the total grade-point averages of the 1954 graduate group and the raw scores made on each test of the entrance examination battery.

CHAPTER IV

RESULTS

CHAPTER IV

RESULTS

A convenient scale had to be established in order to facilitate the determination of grade-point averages for the 500 students involved. The usual procedure at the University of Kansas is to assign the letter grade "A" a numerical rating of 3.0, the letter grade "B" a numerical rating of 2.0, and so on through the other letter grades. However, this system is not too convenient in that negative numbers and zeros are involved below the letter grade of "C." In order to establish a more convenient numerical system, it was decided to award the letter grade "A" a numerical value of 5.00 and progress down through the letter grades until reaching "F" with a numerical value of 1.00. This procedure will be followed throughout the study.

The grade-point averages for the basic course were determined by adding the four semester grades (using the numerical scale outlined in the previous paragraph), multiplying the sum by one (one hour credit given for each semester of the basic course), and dividing the result by four which represents the total number of hours of credit given for the basic course. This gives each

student his grade-point average for the basic course which covers his first four semesters.

The advanced course grade-point averages were computed the same way as were the basic averages except for multiplying the sum of the semester grades by three rather than one, and dividing the result by 12 instead of four. The difference, of course, is because of the three hours of credit given each semester in the advanced course.

The Distribution of Grade-Point Averages

The tables and graphs that follow show the distribution of grade-point averages and mean grade-point averages for various groups.

GRAPH 1

1954 GRADUATES

BASIC COURSE GRADE-POINT AVERAGES

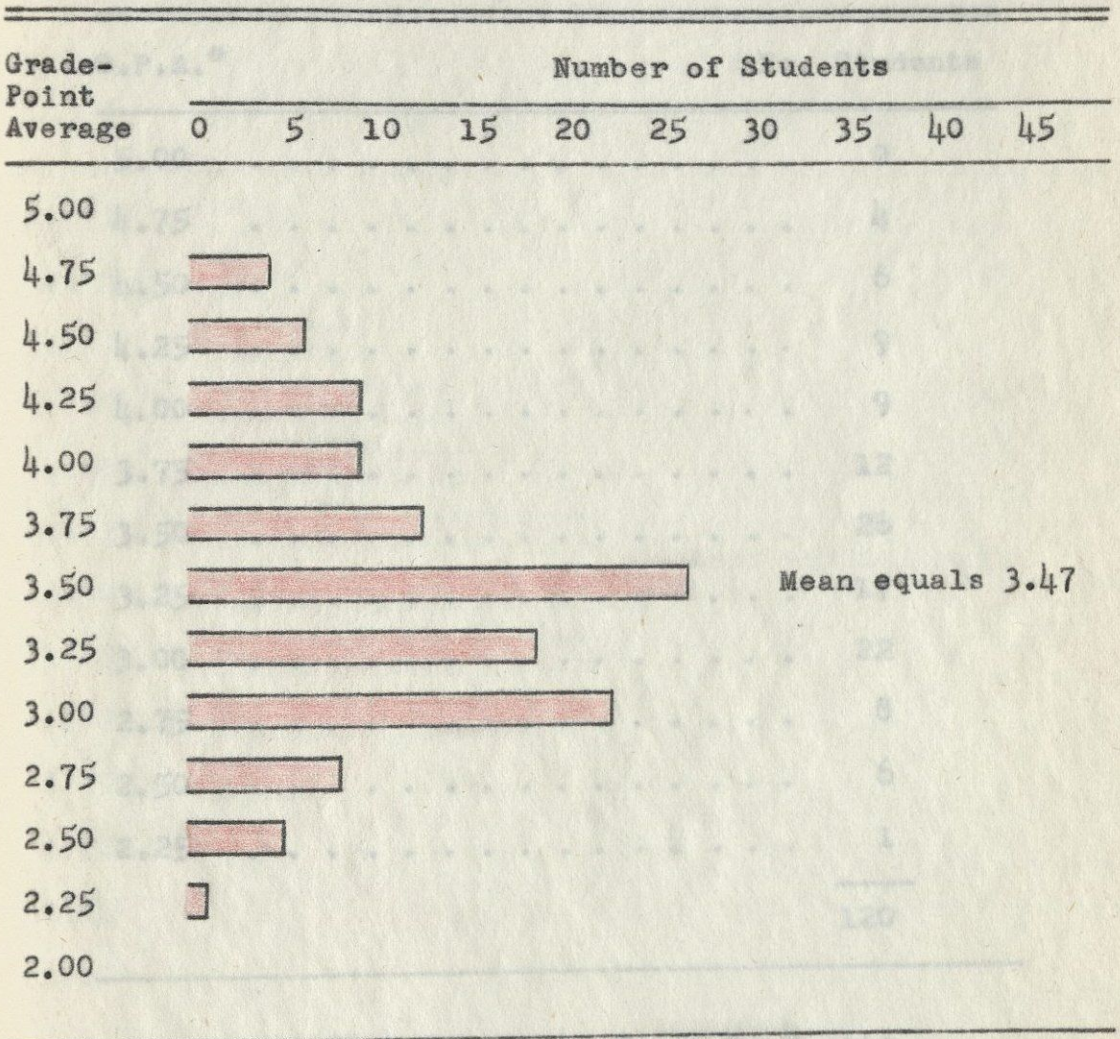


TABLE 5

1954 GRADUATES

BASIC COURSE GRADE-POINT AVERAGES

G.P.A.*	No. Students
5.00	0
4.75	4
4.50	6
4.25	9
4.00	9
3.75	12
3.50	26
3.25	17
3.00	22
2.75	8
2.50	6
2.25	1
	120

* A equals 5, B equals 4, C equals 3, etc.

GRAPH 2

SENIORS

BASIC COURSE GRADE-POINT AVERAGES

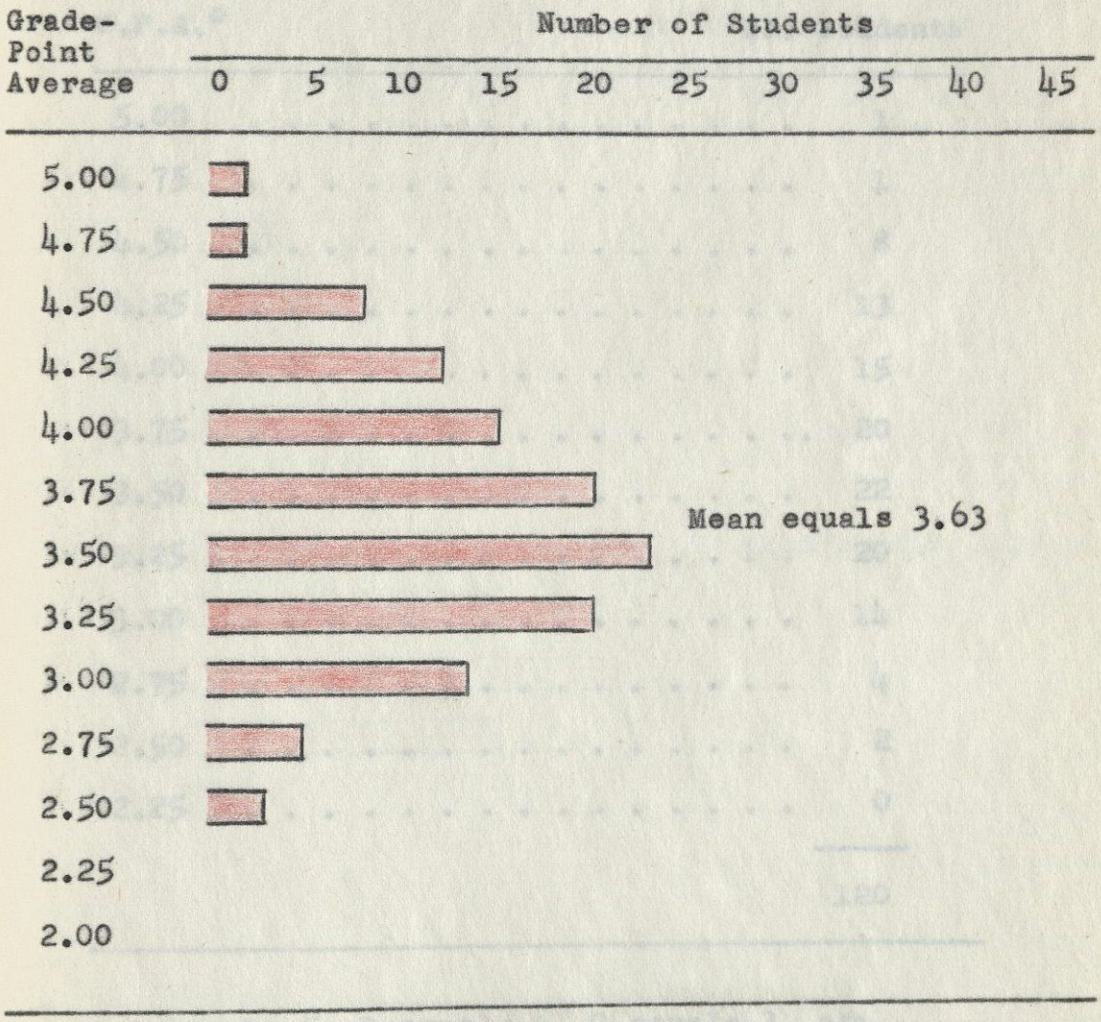


TABLE 6

SENIORS

BASIC COURSE GRADE-POINT AVERAGES

G.P.A.*	No. Students
5.00	1
4.75	1
4.50	8
4.25	13
4.00	15
3.75	20
3.50	22
3.25	20
3.00	14
2.75	4
2.50	2
2.25	0
	120

* A equals 5, B equals 4, C equals 3, etc.

GRAPH 3

JUNIORS

BASIC COURSE GRADE-POINT AVERAGES

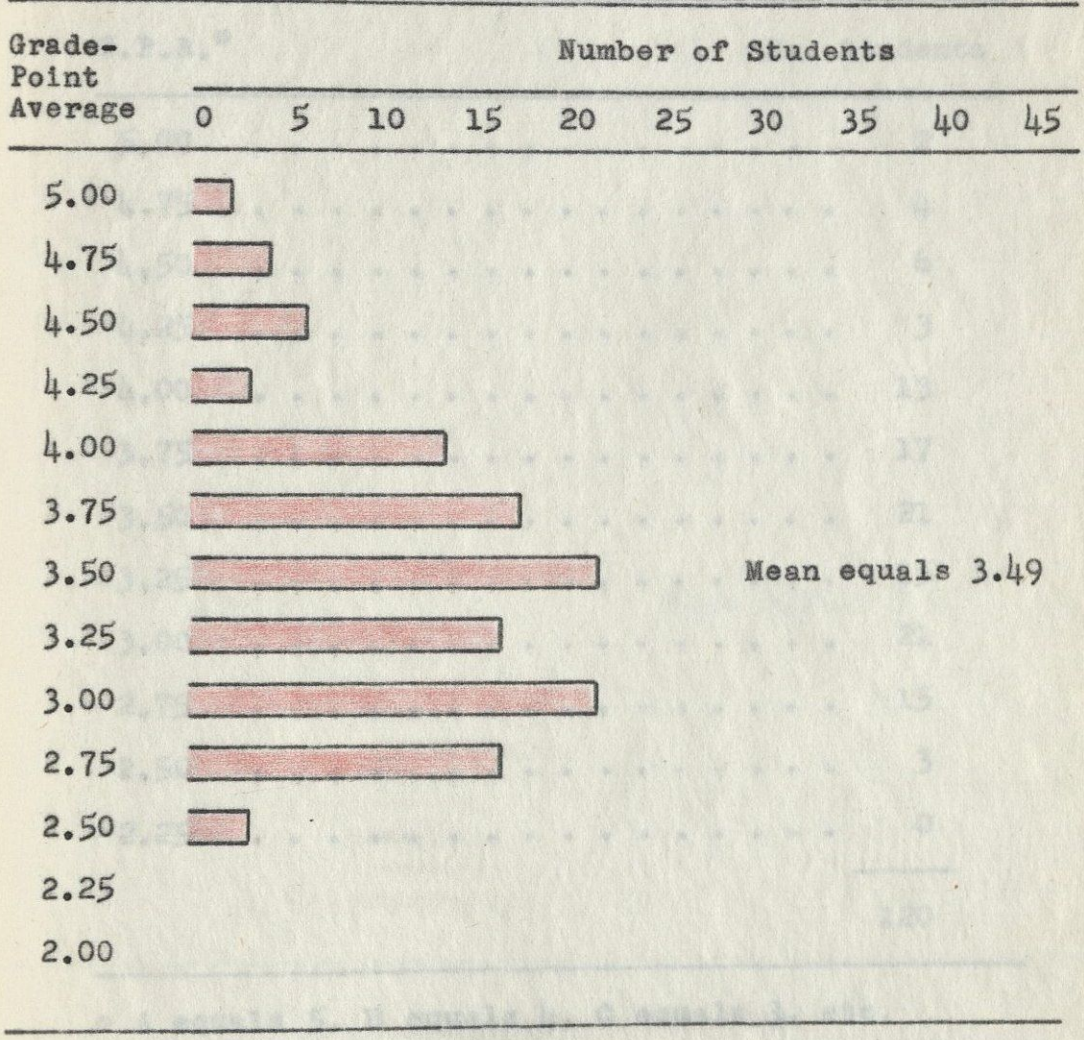


TABLE 7

JUNIORS

BASIC COURSE GRADE-POINT AVERAGES

G.P.A.*	No. Students
5.00	2
4.75	4
4.50	6
4.25	3
4.00	13
3.75	17
3.50	21
3.25	15
3.00	21
2.75	15
2.50	3
2.25	0
	120

* A equals 5, B equals 4, C equals 3, etc.

GRAPH 4

WITHDRAWALS

BASIC COURSE GRADE-POINT AVERAGES

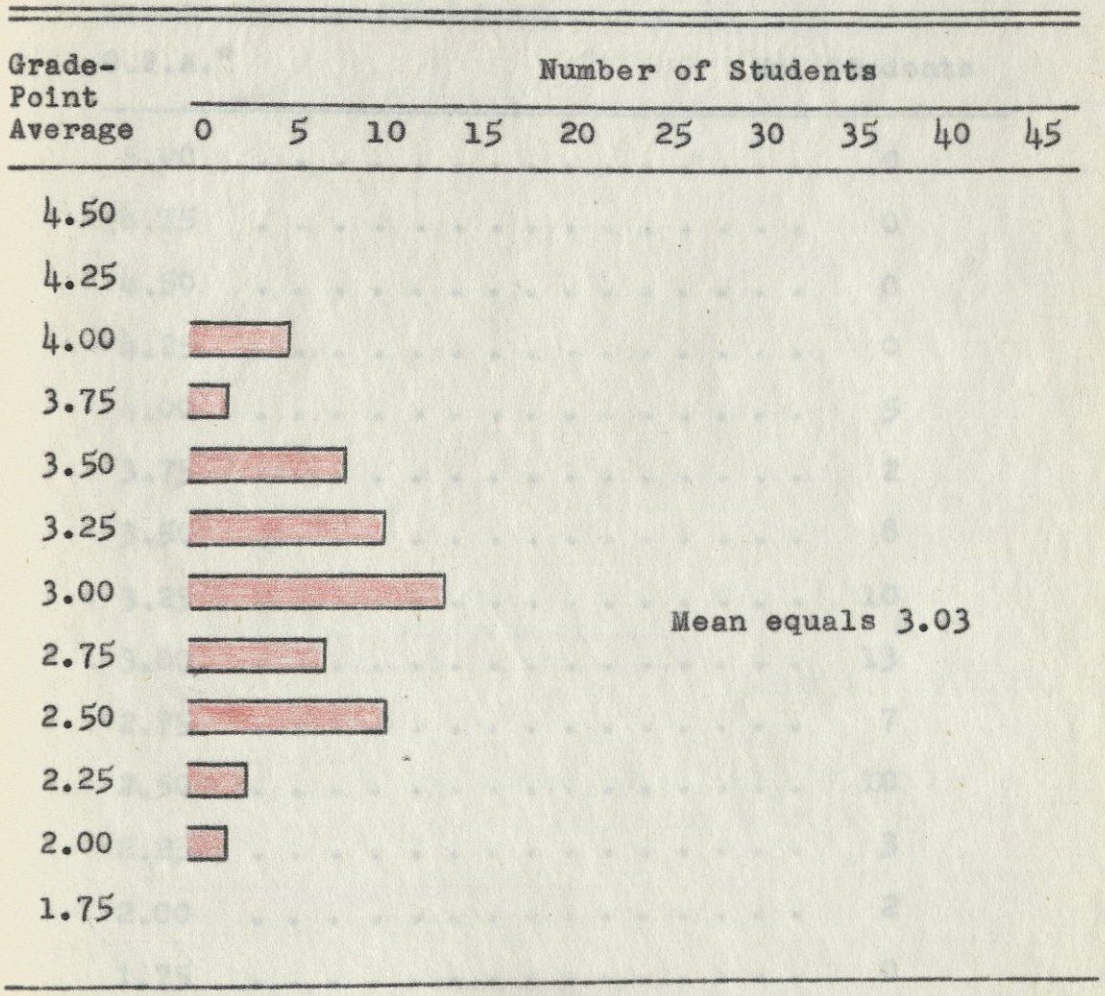


TABLE 8

WITHDRAWALS

BASIC COURSE GRADE-POINT AVERAGES

G.P.A.*	No. Students
5.00	0
4.75	0
4.50	0
4.25	0
4.00	5
3.75	2
3.50	8
3.25	10
3.00	13
2.75	7
2.50	10
2.25	3
2.00	2
1.75	0
	60

* A equals 5, B equals 4, C equals 3, etc.

GRAPH 5

FAILURES

BASIC COURSE GRADE-POINT AVERAGES

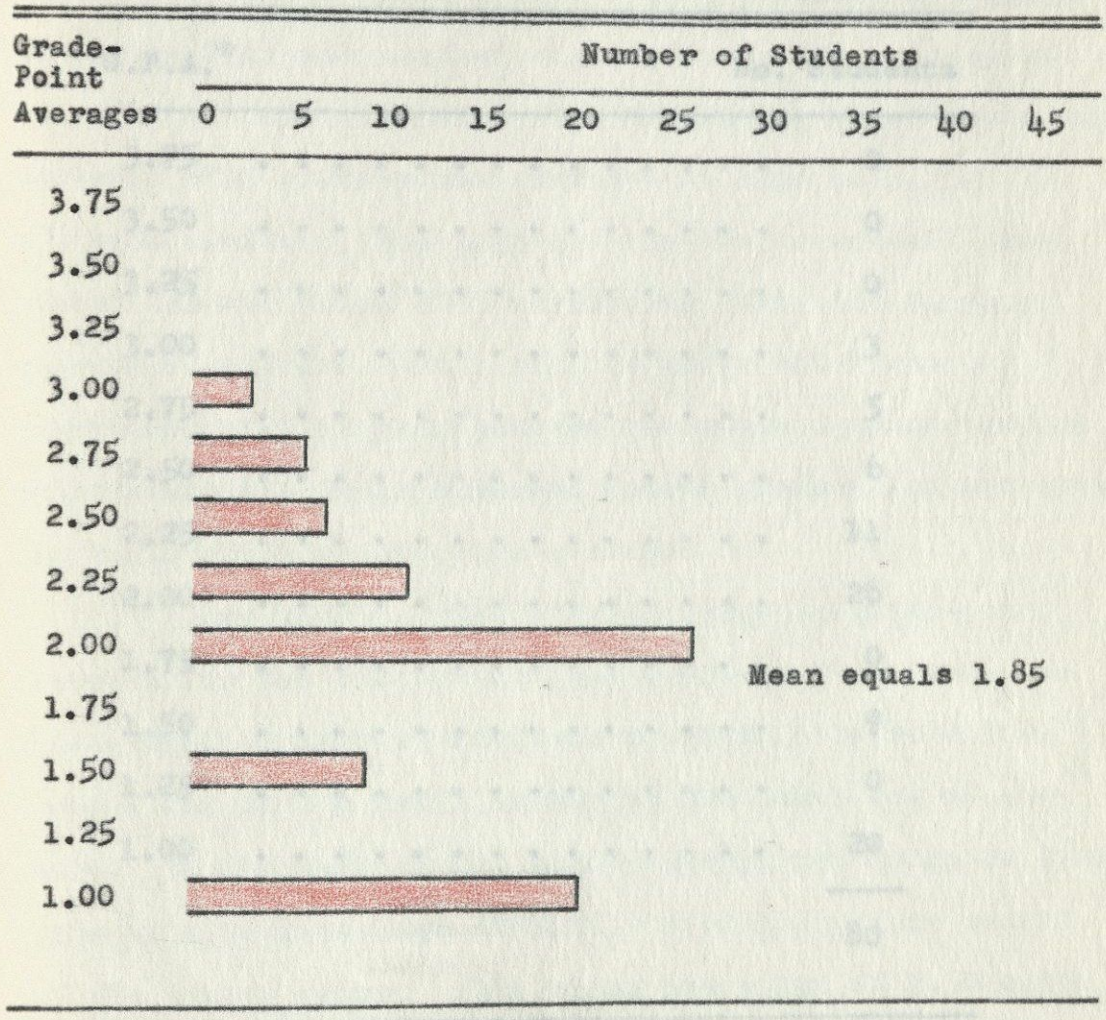


TABLE 9

FAILURES

BASIC COURSE GRADE-POINT AVERAGES

G.P.A.*	No. Students
3.75	0
3.50	0
3.25	0
3.00	3
2.75	5
2.50	6
2.25	11
2.00	26
1.75	0
1.50	9
1.25	0
1.00	20
	80

* A equals 5, B equals 4, C equals 3, etc.

An examination of Graphs 1 through 5 and Tables 5 through 9 shows there is quite a range in the degree of success attained by the students in each group. For example, among the 1954 graduates there was one student who completed the basic course with a grade-point average as low as 2.25 and another six students with grade-point averages of 2.50. In this same graduating class there were students with grade-point averages as high as 4.75. All of these students, the high and the low, eventually completed the Air Force ROTC curriculum, but with varying degrees of success. This will be shown later when a comparison will be made between their basic course grade-point averages, their advanced course grade-point averages, and their total grade-point averages.

One notes a very similar range in grade-point averages for the senior and junior groups. Again we see that a small number of students still fall below a 3.00 average and also a small number at the other end of the scale. In the case of the senior group, the range is from a low of 2.50 to a high of 5.00. A similar range exists for the junior group. This group has a low of 2.50 and a high of 5.00.

There is also a fairly large range found in the withdrawal group. However, there is a noticeable difference between this group and the 1954 graduate, senior, and junior

groups. The range is not as great and also the grade-point averages have a tendency to be lower on the scale than the three groups previously mentioned. You will note that the range is from a low of 2.00 to a high of 4.00, whereas in the other groups mentioned above the low was 2.25 and the high was 5.00. Although this difference is noticeable, it is not as great as one might expect. One would be led to expect a much greater difference between graduates who have successfully completed a course of instruction and a group who have withdrawn before the completion of the course. This difference may be explained by the fact that the withdrawal group was faced with several situations which would not normally confront students pursuing other academic curricula. One situation which influenced the withdrawal of many students was the requirement that the majority of these students be physically qualified for flying in order to continue the Air Force ROTC curriculum. Many of the students in this group were doing very well academically at the time of their withdrawal, but failed to pass their physical examination and were forced to withdraw--not because of academic deficiencies but because of physiological deficiencies. This one factor undoubtedly constitutes the largest single reason for the difference between the groups not being larger. An examination of Graph 5 and

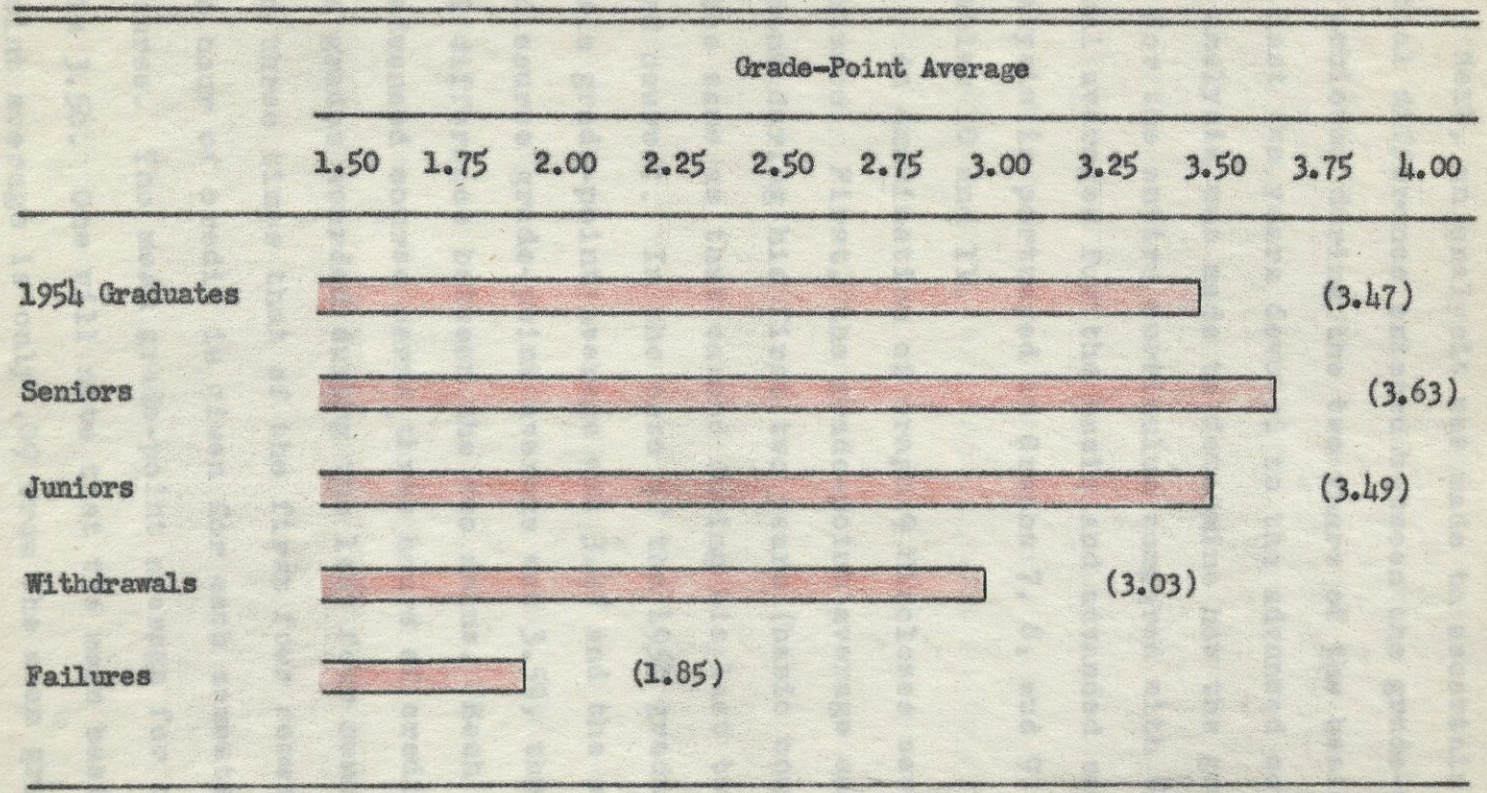
Table 9 shows the range of the last group, the failures, is approximately the same as the withdrawal group. However, there is the natural tendency for the averages to be centered toward the lower end of the scale. The range goes from a high of 3.00 to a low of 1.00.

Comparison of Basic Course G.P.A.'s For Five Groups

It is interesting to note from an examination of Graph 6 that the mean grade-point average for the 1954 graduates, seniors, and juniors is remarkably close. The 1954 graduates and the juniors are practically the same with averages of 3.47 and 3.49 respectively, and the seniors are very close with 3.63. A difference of approximately one-half a grade point exists between the groups just mentioned and the withdrawals. The withdrawals had a mean grade-point average of 3.03. The largest difference in mean grade-point average came between the failure group and the other four groups under study. Their mean grade-point average of 1.85 was considerably below any of the other groups.

GRAPH 6

MEAN G.P.A. FOR FIVE GROUPS (BASIC COURSE)



Basic and Advanced Course Grade Comparison

Next, an analysis was made to ascertain if a substantial difference existed between the grade-point average achieved during the two years of the basic course and the last two years devoted to the advanced course. Further analysis was made to determine how the grade-point average for the entire curriculum compared with the individual averages for the basic and advanced courses. This analysis is portrayed in Graphs 7, 8, and 9, as well as in Tables 10 and 11.

An examination of Graph 9 discloses several items of importance. First, the grade-point average earned by the student during his first two years (basic course) is nearly the same as that earned during his last two years (advanced course). In the case of the 1954 graduates, the mean basic grade-point average was 3.47 and the mean advanced course grade-point average was 3.59, thus giving only .12 difference between the two means. Each semester of the advanced course earns three hours of credit; therefore the grades awarded during the last four semesters are weighted three times that of the first four semesters since only one hour of credit is given for each semester of the basic course. The mean grade-point average for the entire course is 3.56. One will note that the mean basic course grade-point average is only .09 from the mean grade-point

average for the entire course. With the mean grade-point average of the basic course being so close to the mean grade-point average of the advanced course and the entire course, one would be led to believe that the grades made by a student during his first four semesters could be used in most cases as an indicator of the student's achievement during his final four semesters.

To further check on the authenticity of the assumption made above, a check was made on the mean grade-point average earned by the senior group as compared with the mean grade-point average made by this same group during their basic course. Only one year's advanced course work (two semesters) was available because of their senior status, but it was found that their mean grade-point average for these two semesters of the advanced course was 3.42. The mean grade-point average for this same group during their basic course was 3.63. This represents a difference of .21. Although this difference is greater than the difference found in the 1954 graduate group, it still is only about one-fifth of a letter grade difference.

GRAPH 7

1954 GRADUATES

ADVANCED COURSE GRADE-POINT AVERAGES

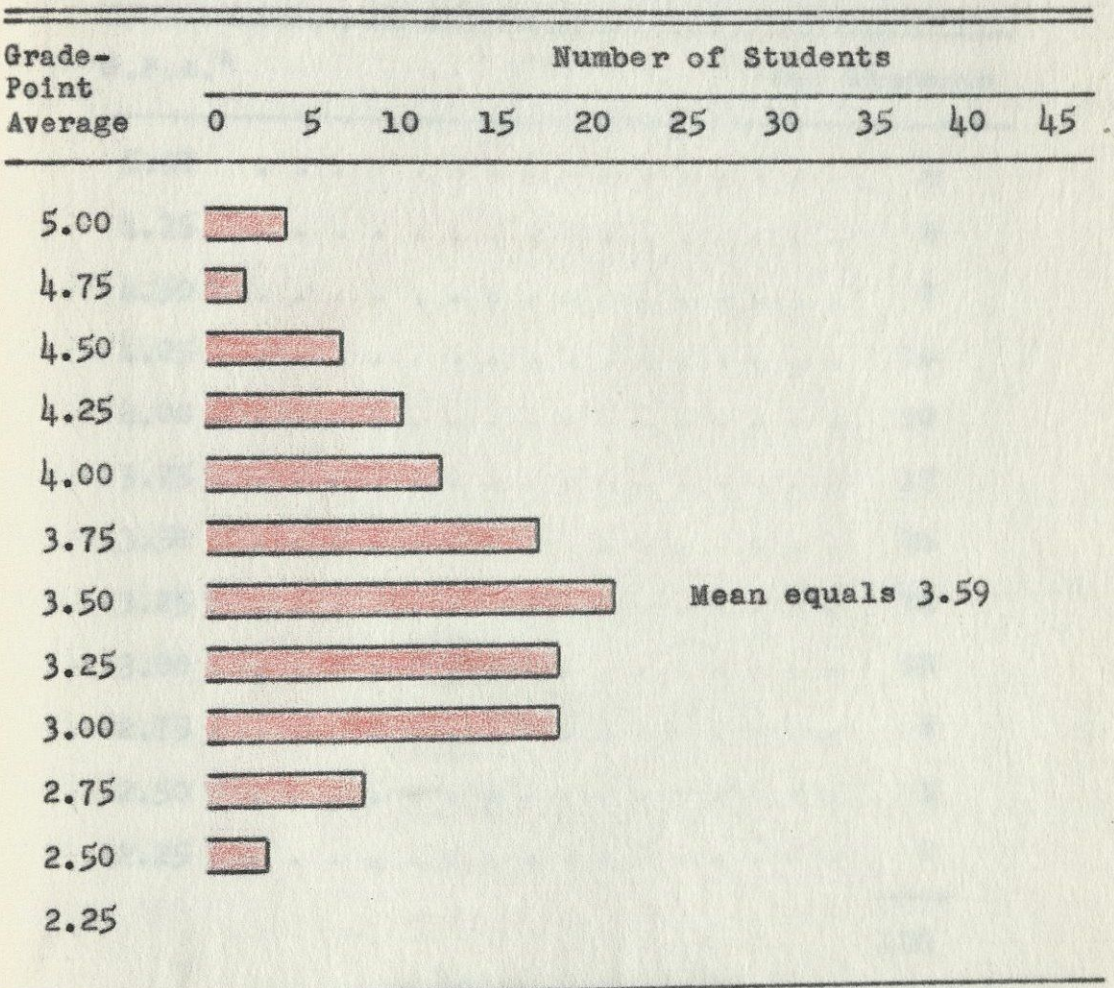


TABLE 10

1954 GRADUATES

ADVANCED COURSE GRADE-POINT AVERAGES

G.P.A.*	No. Students
5.00	4
4.75	2
4.50	7
4.25	10
4.00	12
3.75	17
3.50	21
3.25	18
3.00	18
2.75	8
2.50	3
2.25	0
	120

* A equals 5, B equals 4, C equals 3, etc.

GRAPH 8

1954 GRADUATES

ENTIRE COURSE GRADE-POINT AVERAGES

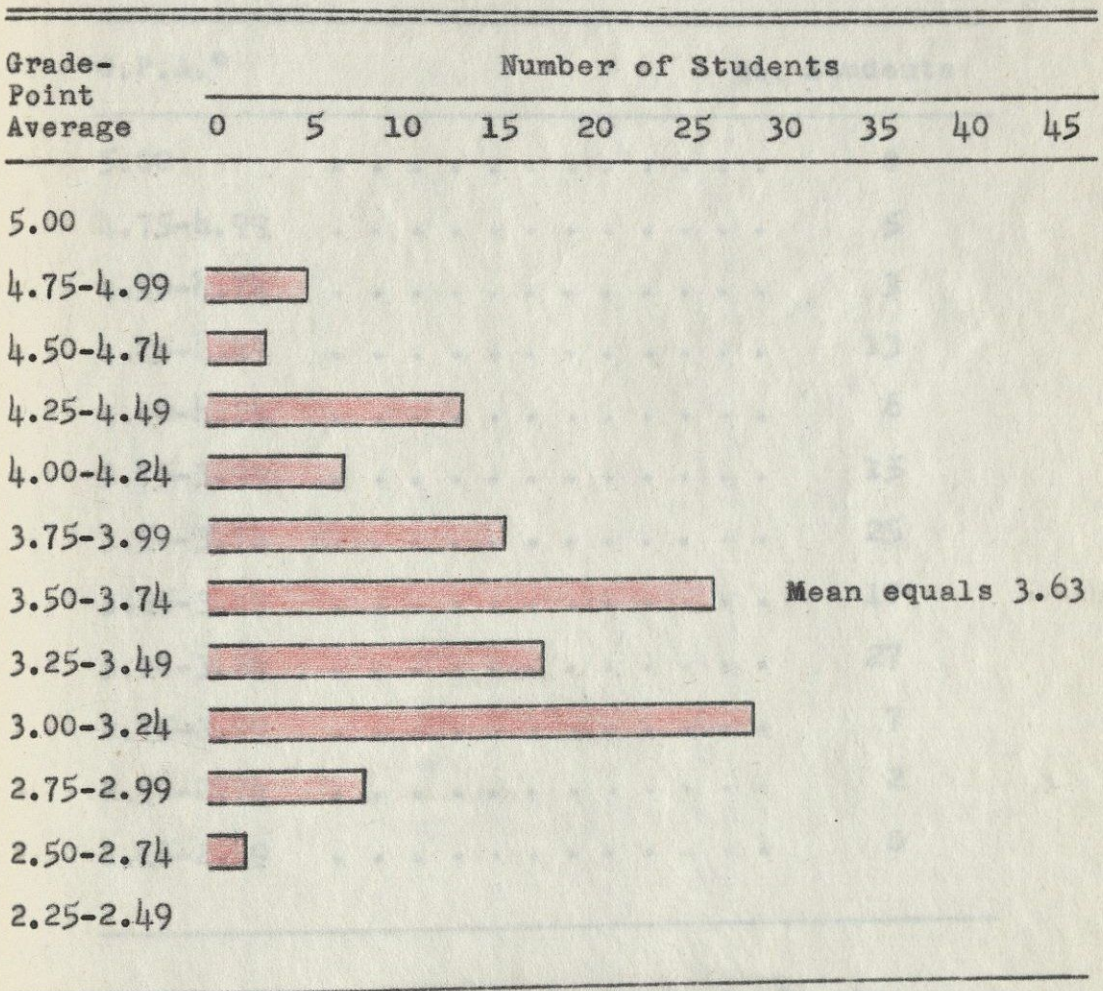


TABLE 11

1954 GRADUATES

ENTIRE COURSE GRADE-POINT AVERAGES

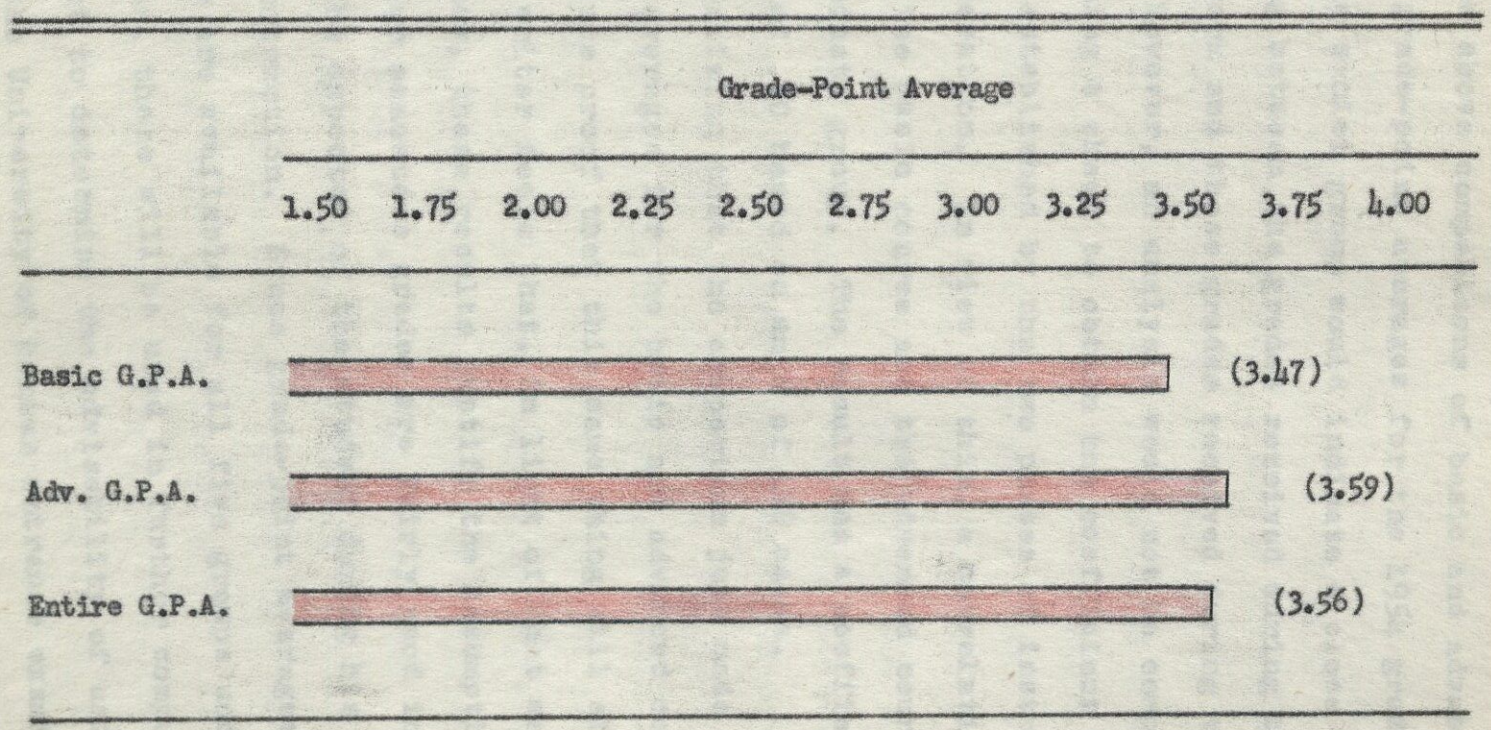
G.P.A.*	No. Students
5.00	0
4.75-4.99	5
4.50-4.74	3
4.25-4.49	13
4.00-4.24	6
3.75-3.99	15
3.50-3.74	25
3.25-3.49	17
3.00-3.24	27
2.75-2.99	7
2.50-2.74	2
2.25-2.49	0

* A equals 5, B equals 4, C equals 3, etc.

GRAPH 9

1954 GRADUATES

GRADE-POINT AVERAGE BREAKDOWN



Correlation--Basic G.P.A. and Advanced G.P.A.

The above comparisons of basic and advanced course mean grade-point averages for the 1954 graduate group and the senior group would indicate a close relationship existing between the grades received during the first two year's work and those grades received during the last two years. However, an analysis would not be complete without running a check to obtain the coefficient of correlation established by the two phases of instruction under consideration. In view of this, a correlation was run between the basic course and the advanced course of the 1954 graduate group. The result was a coefficient of correlation of .70 based on an N of 120 cases.

Realizing that the comparison just made of mean grade-point averages for the basic and advanced courses is not absolute proof that this same thing will always happen, the writer feels that, in light of what we presently know, these results justify the assumption that the first four semesters grades are fairly good indicators of what can be expected of the student during his entire course of instruction. Since grade-point averages for the basic course are available for all five groups under consideration, these will be used in further computations in an attempt to determine the advisability of using the results of the University of Kansas entrance examination

battery as a predictor of success in the Air Force ROTC program.

Comparison of Entrance Examination Results-- Top 25% and Lower 25% AFROTC Students

It was deemed advisable, as the next step in the study, to analyze the grades of the students who received the highest grade-point averages in the basic AF ROTC course and those who received the lowest grade-point averages in order to see if there was any pronounced difference in the scores made by these two groups on the entrance test battery. The 1954 graduates, the seniors, the juniors, and the withdrawals were each divided into two groups. The basic course grade-point averages were analyzed and from each group two sub-groups were extracted. One sub-group contained the students who fell within the top 25% of their main group in relation to AF ROTC basic course grade point averages. The other sub-group represented the students falling within the lowest 25% of their main group in respect to basic course grade point averages.

The mean raw score made on each individual section of the entrance test battery was computed for the high group. The same thing was done for the lowest group. In addition, the mean raw scores for the entire group were figured. The results of this analysis is shown in Tables 12, 13, 14, and 15.

TABLE 12

MEAN RAW SCORES OF SELECTED GROUPS—1954 GRADUATES

TEST	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Lower 25%	Mean Raw Score of Entire 1954 Graduate Group	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Upper 25%
A.C.E. Psychological Examination			
Quantitative	40.8	47.5	51.2
Linguistic	63.4	70.1	73.6
Total	103.4	116.7	124.8
Reading Comprehension Examination			
Vocabulary	28.1	32.7	35.9
Speed of Comp.	26.0	31.1	35.1
Cooperative English Examination			
Usage	80.7	96.0	108.1
Spelling	15.0	17.5	20.2
Vocabulary	34.8	42.0	47.4
Kansas Mathematics Examination	52.2	57.0	62.0

TABLE 13

MEAN RAW SCORES OF SELECTED GROUPS—SENIORS

TEST	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Lower 25%	Mean Raw Score of the Entire Senior Group	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Upper 25%
A.C.E. Psychological Examination			
Quantitative	48.6	50.8	54.8
Linguistic	61.7	66.9	71.9
Total	110.2	117.8	127.1
Reading Comprehension Examination			
Vocabulary	27.2	29.8	32.8
Speed of Comp.	25.4	30.2	36.2
Cooperative English Examination			
Usage	88.0	95.9	107.7
Spelling	15.4	16.4	20.0
Vocabulary	34.5	37.5	44.6
Kansas Mathematics Examination	57.4	58.0	62.0

TABLE 14

MEAN RAW SCORES OF SELECTED GROUPS—JUNIORS

TEST	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Lower 25%	Mean Raw Score of the Entire Junior Group	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Upper 25%
A.C.E. Psychological Examination			
Quantitative	44.3	46.8	48.2
Linguistic	63.1	66.7	71.6
Total	107.1	113.4	119.9
Reading Comprehension Examination			
Vocabulary	28.3	31.2	36.8
Speed of Comp.	27.0	31.8	39.7
Cooperative English Examination			
Usage	83.8	91.9	100.3
Spelling	13.5	16.0	20.5
Vocabulary	33.8	39.8	49.6
Kansas Mathematics Examination	53.9	56.3	59.4

TABLE 15

MEAN RAW SCORES OF SELECTED GROUPS--WITHDRAWALS

TEST	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Lower 25%	Mean Raw Score of Entire Withdrawal Group	Mean Raw Score of Students with a Basic AF ROTC G.P.A. in the Upper 25%
A.C.E. Psychological Examination			
Quantitative	38.3	43.6	47.9
Linguistic	59.7	62.3	69.8
Total	97.9	105.9	117.5
Reading Comprehension Examination			
Vocabulary	24.3	27.0	32.1
Speed of Comp.	22.2	27.3	37.1
Cooperative English Examination			
Usage	67.7	77.0	92.7
Spelling	9.3	14.4	19.0
Vocabulary	31.1	35.1	42.5
Kansas Mathematics Examination	47.2	51.1	65.2

Tables 12, 13, 14, and 15 indicate an apparent difference between the mean scores made by the students in the top 25% and the students falling within the lower 25%. The degree of difference varies on different tests and also within groups, but the general trend is for the range between the mean scores of the top 25% and the lower 25% of each group to be comparatively large. In fact, there is not a case where the lowest 25% had a mean score even as high as the average of the entire group. The mean of the top 25% was, in all cases, above the mean for the entire group and the mean of the lower 25%.

Comparison of Groups-- Mean Scores on Entrance Examinations

In addition to analyzing the differences arising within the individual groups, as was done above, it was felt advisable to study the differences between the groups. In other words, check to see how the 1954 graduates, the senior group, withdrawals, etc. compared as to their mean scores on the different tests in the entrance examination battery. This was done in the following comparison. The mean score for each group was used as a basis for comparison. Mean scores were figured for each group on all nine sections of the battery. The results are shown in Tables 16, 17, and 18.

TABLE 16

COMPARISON OF THE MEAN RAW SCORES FOR EACH GROUP

A.C.E. PSYCHOLOGICAL EXAMINATION

GROUP	Quantitative	Linguistic	Total
1954 Graduates	47.5	70.1	116.7
Seniors	50.8	66.9	117.8
Juniors	46.8	66.7	113.4
Withdrawals	43.6	62.3	105.9
Failures	39.4	55.4	94.8

TABLE 17

COMPARISON OF THE MEAN RAW SCORES FOR EACH GROUP

READING COMPREHENSION EXAMINATION AND THE KANSAS MATHEMATICS EXAMINATION

GROUP	Reading Comprehension Examination		Kansas Mathematics Examination
	Vocabulary	Speed of Comprehension	
1954 Graduates	32.7	31.1	57.0
Seniors	29.8	30.2	58.0
Juniors	31.2	31.8	56.3
Withdrawals	27.0	27.3	51.1
Failures	23.0	20.9	46.4

TABLE 18

COMPARISON OF THE MEAN RAW SCORES FOR EACH GROUP

COOPERATIVE ENGLISH EXAMINATION

GROUP	Usage	Spelling	Vocabulary
1954 Graduates	96.0	17.5	42.0
Seniors	95.9	16.4	37.5
Juniors	91.9	16.0	39.8
Withdrawals	77.0	14.4	35.1
Failures	72.0	10.9	28.8

An inspection of Tables 16, 17, and 18 shows a rather small range existing between the mean scores of the 1954 graduates, the seniors, and the juniors. The mean scores on all of the separate tests are fairly close together and one individual group is not consistently higher than the rest on all tests. These three groups seem to be rather similar. This high degree of similarity does not hold when comparing the three groups mentioned above with the withdrawals and the failures. The withdrawal group is consistently below the 1954 graduates, the seniors, and the juniors. However, the difference is not too great. One might expect a larger difference, but again this can possibly be explained, as was done earlier in the study, by the fact that many of the men in the withdrawal group did not withdraw because of academic deficiencies

as might be expected of a normal group of students withdrawing from a course of study. A number of these students withdrew, not because of poor grades, but because they were not eligible for flight training upon graduation.

An outstanding difference between the groups is noticed when one compares the mean raw scores of the 1954 graduates, the seniors, and the juniors with the failure group. In all cases, on all tests, this group was considerably below the 1954 graduates, the seniors, and the juniors.

Correlation Between 1954 Graduate Total Grade-Point Averages and the Various Tests of the Entrance Test Battery

A correlation was run between the total grade-point averages of the 1954 graduate group and scores made on the tests making up the entrance test battery as follows: (a) Quantitative, Linguistic, and Total for the A.C.E. Psychological Examination; (b) the Vocabulary and Speed of Comprehension tests combined of the Reading Comprehension Examination; the entire Cooperative English Examination; and the Kansas Mathematics Examination. The following table shows the results.

TABLE 19

COEFFICIENTS OF CORRELATION BETWEEN TOTAL GRADE-POINT AVERAGE OF 1954 GRADUATE GROUP AND VARIOUS TESTS ON THE K.U. ENTRANCE EXAMINATION BATTERY

A.C.E. Psychological Examination	
Quantitative	.433
Linguistic	.224
Total	.497
Reading Comprehension Examination	
Sum of Vocabulary and Speed of Comprehension	.287
Cooperative English Examination	
Sum of Usage, Spelling, and Vocabulary	.310
Kansas Mathematics Examination	.657

N = 120

An examination of Table 19 shows the Kansas Mathematics Examination giving the highest coefficient of correlation followed by the A.C.E. Total and the A.C.E. Quantitative. The lowest coefficient of correlation is given by the A.C.E. Linguistic and the sum of the Reading Comprehension Examinations.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

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SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Now that the study is concluded, one might profit by looking at the proceedings in retrospect. Sometimes it is advantageous to step back from the problem and view it in its entirety. From this vantage point one may discover new insights that were not apparent when the writer was so involved in the multitude of small details which go into making up the whole study.

The saying that "one's hindsight is much better than one's foresight" is certainly apparent at the completion of a study. Many of the perplexing problems encountered, which at the time produced varying degrees of lost motion, could certainly be eliminated if the writer were to do a similar study in the future. Be this as it may--there are more important aspects to be summarized.

The problem was established and set to writing in the first chapter. This seemed to aid in crystalizing the many aspects and implications in the writer's mind. The review of related research which followed made the writer conscious of the fact that he was not alone in trying to find answers to problems of a similar nature.

The review was very enlightening and gave the author many clues as to how the problem could be attacked. A plan of attack was formulated and the collection of data was merely a clerical process. With the raw data in hand, the different phases of the problem were worked out and transformed into results which are believed to present meaningful information to those interested in the problem under study.

The results of the study indicated a wide range of achievement among the selected groups as shown in the distribution of grade-point averages. From a glance at the graphs showing the grade-point distribution, one notes a more or less "normal distribution" of grade-point averages for all groups under consideration.

An examination of the mean grade-point averages of each of the respective groups shows many similarities between certain groups and wide differences between other groups. For example, a close similarity exists between the mean grade-point averages of the 1954 graduate group and the junior group in respect to their basic course mean grade-point averages. Also a wide difference exists between the 1954 graduate group and the failure group in respect to their mean basic course grade-point average.

Further investigation brings to light the fact that the grade-point average earned by a student during

his last four semesters in Air Force ROTC is quite similar to what he attained during his first four semesters in the program. The correlation between the two proved to be .70.

A comparison between the students falling in the top 25% of their group in respect to basic grade-point averages and those falling in the lower 25% showed that in all cases the mean grade made on the entrance examination battery was much higher for the top 25% than for the lower 25%. This proved to be true of all groups studied.

The study also showed both similarities and differences between the groups under consideration in respect to the mean grades made on the different entrance examinations. The 1954 graduate group, the seniors and the juniors were shown to have achieved very similar grades. The mean scores on all of the separate tests are fairly close together and one individual group is not consistently higher than the rest on all tests. This similarity does not hold when one compares any of the three mentioned groups with the withdrawal and the failure groups. Here one finds a great difference. The 1954 graduate group, the seniors, and the juniors are far superior to the failure group and very noticeably above the withdrawal group.

The correlation of total AF ROTC grade-point averages with the scores made on the various entrance

examinations gives an additional answer to our original question. The Kansas Mathematics Examination gives the highest coefficient of correlation, r = .657. The next highest is the A.C.E. Total, r = .497. Following closely behind is the A.C.E. Quantitative, r = .433. The lowest coefficient of correlation is given by the A.C.E. Linguistic, r = .224. The next lowest is the sum of the Reading Comprehension, r = .287.

Conclusions

From the evidence presented in this study one can conclude that there is a fairly high degree of positive correlation between certain tests in the entrance examination battery and success in the Air Force ROTC program at the University of Kansas. One must also conclude that certain other tests in the battery do not give a high enough positive correlation to warrant their use as predictors of success in the Air Force ROTC program. The Kansas Mathematics Examination correlates a positive .657 and the Total A.C.E. correlates .497. One other gives a fairly high degree of positive correlation. This test is the A.C.E. Quantitative with a coefficient of correlation of .433. The other tests correlate positively, but to a much lesser degree than those mentioned above. In view of this, if one uses the entrance examination battery as a predictive device, it would be advisable to use those tests

which have been shown in this study to give the highest degree of positive correlation. There are three which yield a high enough positive correlation to warrent their use in the prediction of success and subsequent selection of students. These are the Kansas Mathematics Examination, the A.C.E. Total, and the A.C.E. Quantitative.

The last conclusion to be drawn is that this study, although producing evidence indicating the feasibility of using certain tests as predictors of success in the Air Force ROTC program, is not the final answer to the problem. Rather it is an initial step in a process of analysis which should lead to further investigation into the many other facets of the overall problem. At least, if nothing else, the study has opened the door to further investigation and offers an invitation to those interested in this problem to take up where this study left off in an attempt to find additional answers.

Recommendations

When it is felt necessary to screen prospective students with the utmost care and highest degree of selectivity, differentiating between students who appear to possess equal qualifications, the writer feels that three of the tests in the University of Kansas entrance examination battery can be put to good advantage. In fact, administrative personnel charged with the responsibility of

selecting only the best qualified students would be passing up a valuable and readily available selection tool if they did not utilize the scores of the Kansas Mathematics Examination, the A.C.E. Total, and the A.C.E. Quantitative Examination as aids in their selection machinery. This recommendation is not to be interpreted to mean that the writer feels that these tests are a panacea which will end all problems of selection, but rather a valuable aid in accomplishing a difficult task. Even though it has been shown in this study that certain tests in the entrance examination battery are fairly good predictors of success in the Air Force ROTC program, it is felt that it would be a mistake to use even the best predictors as the sole basis of selection. They could, however, be very profitably used in conjunction with other selective criteria and their use in this manner is strongly recommended.

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APPENDIX A

APPENDIX A

ADVANCED STUDENT
MILITARY EFFECTIVENESS RATING

_____ AS 2 4 52 54 Date _____
Last name first initial

_____
Position (Squad member, Flight leader, etc.)

1st Gp 2d Gp 3d Gp Band Drill Team Wg Staff
(circle one)

	RATER	ENDORSER	TOTALS
1. Military Bearing and Appearance			
2. Obedience			
3. Attitude			
4. Drill Proficiency			
5. Leadership			
TOTALS			

RATING SCALE:
9-10 Superior
8 Above Average
7 Average
6 Below Average
Below 6 Unsatisfactory

_____
(rater's signature)

_____
(endorser's signature)

Guide to terminology used in rating factors

Military Bearing and Appearance: Uniform compliance, haircut, shave, shoes shined, etc. Physical appearance including general neatness, posture, marching poise, etc. Do not consider physical features over which Cadet has no control.

Obedience: Prompt and satisfactory compliance with orders, instructions, and directives whether oral or written.

Attitude: Spirit, willingness, cooperation, etc. Manner of response to orders and instructions.

Drill Proficiency: Quality of executing movements and positions such as facings, attention, parade rest, saluting, etc.

Leadership: Actual performance in handling administrative duties, drilling troops, conducting staff meetings or formations, supervising others; discipline and military courtesy as reflected by subordinates as well as demonstrated personally; promptness and quality of results achieved; kind of example he sets for others; etc.